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### **Assessing effectiveness of a nonhuman animal welfare education program for Primary School children**

**Citation for published version:**

Hawkins, RD, Williams, JM & Scottish Society for the Prevention of Cruelty to Animals, SSPCA 2017, 'Assessing effectiveness of a nonhuman animal welfare education program for Primary School children', *Journal of Applied Animal Welfare Science*, vol. 20, no. 3, pp. 240-256.  
<https://doi.org/10.1080/10888705.2017.1305272>

**Digital Object Identifier (DOI):**

[10.1080/10888705.2017.1305272](https://doi.org/10.1080/10888705.2017.1305272)

**Link:**

[Link to publication record in Edinburgh Research Explorer](#)

**Document Version:**

Peer reviewed version

**Published In:**

Journal of Applied Animal Welfare Science

**Publisher Rights Statement:**

This is an Accepted Manuscript of an article published by Taylor & Francis in Journal of Applied Animal Welfare Science on 3/4/2017, available online: <http://www.tandfonline.com/doi/full/10.1080/10888705.2017.1305272>.

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Running head: PREVENTION THROUGH EDUCATION

Assessing the Effectiveness of the Animal Welfare Education Programme  
'Prevention through Education' for Primary School Children

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**Assessing the Effectiveness of the Animal Welfare Education Programme ‘Prevention through Education’ for Primary School Children**

**Running title: PREVENTION THROUGH EDUCATION**

**Abstract**

Animal welfare education aims to promote positive relationships between children and animals thus improving animal welfare, yet few scientific evaluations of these programmes exist. This study aimed to evaluate the effectiveness of an animal welfare education programme, ‘Prevention through Education’ developed by the Scottish Society for the Prevention of Cruelty to Animals (Scottish SPCA). The programme included four interventions focusing on pets, wild animals, farm animals and general animal rescue, that were analysed individually. Key factors including: knowledge about animals, knowledge about the Scottish SPCA, attachment to pets, attitudes towards animals and beliefs about animal minds were assessed using a self-complete questionnaire administered to a sample of 1,217 primary school children, aged 7-8 and 10-11 years, across Scotland. A pre-test, post-test and delayed post-test method was employed and test schools were compared to control schools. Results from the evaluation showed a significant impact of the programme on knowledge about animals and knowledge about the Scottish SPCA for all interventions. The pets and farming intervention both had a significant impact on children’s beliefs about animal minds. The results showed trends towards improvements in a range of other child-animal measures but these failed to reach significance. This study highlights the importance of teaching animal welfare education to primary school children for early prevention of animal

cruelty, discusses the need to base this education on theory and research to find effective change, and demonstrates how evidence-based practice can inform future education programmes.

**Keywords:** Animal welfare, animal cruelty, children, education, evaluation

## **Introduction**

Animals play a significant role in children's lives across the world; many ranking their pets as one of their most important and intimate relationships (Melson, 2001; Muldoon, Williams & Lawrence, 2014). Fonseca et al (2011) found that children are intrinsically motivated to treat animals well, respect animals and hold beliefs concerning human responsibilities towards animals. Both animals and children can benefit from this close relationship. For children, having pets can be extremely beneficial in terms of social support, reducing anxiety (e.g. Melson & Schwarz, 1994) and becoming more empathetic towards others (Melson, Peet & Sparks, 1992). Attachment to a pet is associated with higher quality of life and other indicators of mental health and wellbeing among children and adolescents (Marsa-Sambola et al., 2016; Muldoon, Williams & Lawrence, under review). Animals can benefit through improved welfare and treatment. Paul and Serpell (1993) found that children who have a greater involvement in caring for their pets are more likely to be concerned about animal welfare and hold more humane attitudes. The relationship between children and animals can be complex with both positive and negative attributes (Melson, 2003; Bryant, 1990) and animal neglect and abuse remains a significant problem across the UK and the rest of the world (RSPCA, 2016; Scottish SPCA, 2016; ASPCA, 2016, RSPCA Australia, 2016).

Little research specifically addresses the issue of animal cruelty in children, particularly in recent years, with only ten studies being published since 2011 (Hawkins, Hawkins & Williams, In Press; Hawkins & Williams, 2016<sup>2</sup>). Innovative approaches, such as community interventions that target factors associated with behaviour towards animals (e.g. attitudes and knowledge) are crucial for preventing animal cruelty. Research has rarely investigated animal cruelty in general child populations, instead targeting specific sub-groups (e.g. juvenile offenders), extreme behaviour (e.g. violent crime) or traumatic life events such as child abuse or domestic violence (Ascione 2001; Hawkins et al., In Press). Ideally, animal welfare education programmes should be preventative and universal, targeting all children. Investigating methods for prevention of animal cruelty in the general child population is important because many cases of animal cruelty are of neglect and abandonment, due to a lack of knowledge of appropriate care and specific species welfare needs (Vermeulen & Odendaal, 1993; Scottish SPCA, 2013). Animal cruelty is not always intentional. Young children may lack the cognitive maturity to understand that their behaviours may be detrimental to welfare and may harm an animal through natural exploration or as a result of a lack of knowledge about animal behaviour and appropriate care (Ascione, 2005). Educating children about humane animal treatment could therefore prevent unintentional animal cruelty with benefits for both the safety of children (such as preventing dog bites, Shen et al., 2016) and the welfare of animals.

Animal welfare education for children may be one of the most fruitful approaches of improving the welfare of animals. Understanding the mechanisms underlying the child-animal relationship is crucial for the development and evaluation of such programmes. Three broad but interrelated psychological factors play a role in children's relationships with animals: knowledge of welfare needs, empathy towards animals and attitudes towards animals (Muldoon et al., 2009). The specific factors that have been shown to affect children's

92 treatment of animals include: empathy, compassion (Ascione, 1992), knowledge and accurate  
93 understanding of specific animal needs (Coleman, Hall & Hay, 2008; Muldoon et al., 2009;  
94 Williams, Muldoon & Lawrence, 2016), attitudes (Kellert, 1985), direct experience or  
95 proximity to animals (Kahn & Kellert, 2002) and attachment to and feelings of responsibility  
96 towards animals (Muldoon, Williams & Lawrence, 2015). Children's beliefs about animals'  
97 minds (Child-BAM, Hawkins & Williams, 2016<sup>1</sup>), that is holding the belief that non-human  
98 animals are sentient, have the ability to think, feel, communicate and are self-aware, may also  
99 affect how children interact and treat particular animals (Burghardt, 2009; Hawkins &  
100 Williams, 2016<sup>1</sup>). Conceptualising animals as insentient and unintelligent may lead to  
101 behaviours that are considered unacceptable (Knight et al., 2004). Animal welfare education  
102 programmes that target these specific factors, could therefore potentially increase children's  
103 humane treatment of animals. Animal welfare education aims to build upon children's  
104 interest and experience with animals, with the overall goal of increasing children's ability and  
105 willingness to understand another animal's perspective (cognition) and share their emotions  
106 and feelings (affect) as well as increasing pro-social behaviour (Faver, 2010).

107         There is limited but growing evidence that classroom interventions can promote  
108 empathy and positive attitudes and behaviour towards non-human animals (Muldoon et al.,  
109 2009). Previous studies investigating the effectiveness of educational interventions have  
110 found: a positive increase in comfort with pets and understanding of pet care (Zasloff, Hart &  
111 Weiss, 2003), closer bonds and friendships with pets (Tardif-Williams & Bosacki, 2015) a  
112 greater consideration of welfare needs (Jamieson et al., 2012), increased knowledge of  
113 animals (O'Hare & Montminy-Danna, 2001) and responsible pet ownership (Mariti et al.,  
114 2011; Coleman et al., 2008), increased empathy and treatment of animals (Angantyr et al.,  
115 2016; Arbour, Signal & Taylor, 2009), more positive attitudes towards animals (Nicoll et al.,  
116 2008; O'Hare & Montminy-Danna, 2001; Fonseca et al., 2011), humane attitudes and human-

117 directed empathy (Ascione & Weber, 1996) and enhanced perception of animals (Mariti et  
118 al., 2011) and animal sentience (highlighting the benefits of an in-class approach for positive  
119 change; Fonseca et al., 2011).

120 School-based humane education or animal welfare education varies widely on many  
121 dimensions. Programmes vary in specific topics addressed, how the programme is delivered  
122 and their frequency and duration. Education varies greatly in pedagogical approaches  
123 including lesson plans that build academic skills while teaching humane concepts. Many  
124 successful education programmes involve interacting with animals (for example, Nicoll et al.,  
125 2008), while others do not (for example, Ascione, 1992). Although education programmes  
126 vary, most focus on “instilling, reinforcing, and enhancing young people's knowledge,  
127 attitudes, and behaviour toward the kind, compassionate, and responsible treatment of human  
128 and animal life” (Ascione, 1997, p. 60). The potential of universal animal welfare education  
129 programmes as a prevention strategy has been largely ignored and evaluative research is still  
130 in its infancy (Faver, 2010). Although a small number of evaluative studies do exist, there  
131 remains the need for rigorous, methodologically sound research to evaluate the efficacy of  
132 these programmes (Arbour et al., 2009).

133 The aim of this research was to therefore evaluate the effectiveness of an animal  
134 welfare education programme for primary school children delivered by the Scottish Society  
135 for the Prevention of Cruelty to Animals (Scottish SPCA). The Scottish SPCA has a  
136 continued presence in schools reaching over 300,000 children annually across all parts of  
137 Scotland. The Scottish SPCA’s ‘Prevention through Education’ programme comprises of four  
138 interventions, each individually designed to address primary school children’s knowledge  
139 about the welfare needs of animals, as well as encourage empathy and positive attitudes  
140 towards animals. The ultimate goal of these interventions is to prevent animal cruelty from an  
141 early age. The interventions follow the schools existing pedagogy, tie in with the Curriculum

for Excellence in Scotland, are founded on sound educational and psychological principles and have been extensively piloted with schools. The workshops engage children in teamwork, role play, discussion and debate. Children are encouraged to voice their views and experiences of animal welfare, to act as positive role models, and to learn about potential career opportunities with animals. The workshops use a variety of materials to engage children with animal welfare issues.

This research uses a controlled intervention design employing repeated testing (pre-test, post-test and delayed post-test) and comparing children who participated in a workshop to those who had not yet participated, to discriminate between the impact of the educational workshops and general time effects. The evaluation research was carried out independently of the welfare organisation that designed and implemented the education programme.

## **Research questions**

1. How effective is the 'Scottish SPCA Animal Friendly Citizens' intervention for knowledge, attitudes, attachment and beliefs about animal minds?
2. How effective is the 'You and Your Pet' intervention for knowledge, attitudes, attachment and beliefs about animal minds?
3. How effective is the 'Wildlife Welfare' intervention for knowledge, attitudes, attachment and beliefs about animal minds?
4. How effective is the 'Food and Farm Animal Welfare' intervention for knowledge, attitudes, attachment and beliefs about animal minds?

*Predictions:* There will be a significant pre- to post-test change for: knowledge, Child-BAM, attitudes towards animals, and attachment to pets for each intervention. It was also predicted that these observed changes would be maintained six weeks later.



## Methods and Materials

**Design:** A mixed factorial design was used to evaluate each intervention. One variable was phase of testing (time), a repeated measures variable with two conditions: pre-tests (day before workshops) and post-tests (day after workshop). Delayed post-tests (six weeks later following schools summer holiday) analysis was carried out on a sub-sample of the total, based on schools who agreed to participate. The between subject's variable was the intervention condition (intervention versus control). The same control group data was used in each analysis.

**Participants:** The test group comprised a total of 1090 children from 22 primary schools (Male, n = 552, Female, n = 538, Mean age = 9.7 years range 6.4-12.2 years). Children were sampled from two year groups (Primary 4: ages 7-8 years 52.8% of sample and Primary 6: 10-11 years 47.2% of sample). Some schools included composite classes where target year groups were combined with another year group into classes. The overall age range in this study is an important phase of moral development (e.g. Kohlberg, 1958), it is also a time of conceptual change in biology knowledge (e.g. Williams, 2012; Myant & Williams, 2005), when children are likely to be receptive to learning about animal welfare needs. Research also highlights that it is a target age group for many animal welfare organisations' education programmes (Muldoon et al., 2009).

Opportunistic sampling was employed whereby schools that had already booked the Scottish SPCA interventions were invited to participate in the research study. The interventions included 'Scottish SPCA Animal Friendly Citizens' (AFC; n = 771), 'Wildlife Welfare' (WW; n = 157), 'You and Your Pet' (YYP; n = 39) or 'Food and Farm Animal Welfare' (FFAW; n = 183). The control group (n = 127) included three primary schools (Male, n = 71, Female, n = 56, Mean age = 9.4 years range 6.4-11.9 years). The control group had no

previous engagement with the Scottish SPCA programme. Due to time constraints for the schools, only a small percentage of the schools agreed to participate in delayed post-tests and so a total of 447 children, from seven test schools only, completed all three questionnaires. Children in the control groups completed pre-test and post-test questionnaires only.

Ethical Considerations: The ethical guidelines of the British Psychological Society, specifically relating to research with children, were adopted for this research and ethical consent was granted from the University of Edinburgh's Clinical and Health Psychology Ethics Committee. All information was treated confidentially and kept in a secure location at all times; child and school data were anonymised during data preparation by adopting identity numbers.

Intervention Materials and Procedure: The pre-tests, intervention workshops and post-tests were conducted over three consecutive school days; the control group followed the same pattern but did not receive an intervention workshop on the second day. A self-complete questionnaire was developed as the evaluation tool and administered to all children by a teacher at each stage of the study during class time.

#### ***'Prevention through Education' Programme Interventions***

Each test school chose to participate in one of four one-hour interactive educational interventions which were delivered by a Scottish SPCA staff member within school classrooms. All interventions began with a 15-minute PowerPoint slideshow about the Scottish SPCA and factual information about the focus of the intervention including photographs and video footage. The slideshows were followed by one themed activity relating to the focus of the intervention, a card game, and then ended with a general question and answer session. Common themes of promoting animal welfare knowledge, positive attitudes, empathy towards animals, and knowledge of the Scottish SPCA were integral to all interventions but each had a specific focus. The interventions are updated each year, covering

the same content but may be delivered in a different format, taking into account current research outcomes and suggestions to ensure effectiveness. This allows schools to engage with the Scottish SPCA's education programme annually by selecting different workshops each year.

*'Scottish SPCA Animal Friendly Citizens'* introduced the Scottish SPCA's work within the community. With the use of videos, this workshop gave pupils an opportunity to role-play as animal rescue officers, think about how they would rescue an animal and what equipment would be required. This intervention emphasised how pupils can be responsible animal welfare citizens, in particular when it comes to hazards to animals caused by litter.

*'Wildlife Welfare'* focused on the diversity of Scottish wildlife that the Scottish SPCA rescues and introduced how animals need to compete to survive the seasonal weather and how human activities can cause conflict with wildlife. This intervention included an educational board game. The use of video clips helped pupils gain a better understanding of an animal's journey from arriving at the wildlife rescue centre through to release.

*'You and Your Pet'* focused on the Scottish SPCA's work across Scotland, ownership responsibilities and pet care along with health and hygiene around animals. This intervention also involved a maze challenge game.

*'Food and Farm Animal Welfare'* intervention highlighted the Scottish SPCA's work with Scotland's farming and food industries. Children were challenged to identify what was fact or fiction in a farming challenge game and also learned about farm animal produce and food packaging labels.

*Pre and post-questionnaires*

A quantitative self-complete questionnaire served as the evaluation tool for this study. The paper, tick box questionnaire used appropriate terminology for 7-13 year-olds and was UK language compatible. The questionnaire was piloted with three test schools ( $n = 91$ , girls = 50, boys = 41, ages 6-9 = 27, ages 10-13 = 64) confirming the questionnaires suitability for the age and understanding of the participants. The questionnaire took approximately 20 minutes to complete. The questionnaire, as well as asking for age, gender and school class, tested for a wide range of variables relating to positive and negative interactions with animals, including:

*Knowledge of Animal Welfare Needs:* Knowledge about animals, specifically relating to the content of the workshops, was assessed using one scale that asked children to ‘decide whether you think the following statements are true or false’ with nine items (e.g. ‘you should never give hedgehogs milk’). Each item had three options (1-‘true’, 2-‘not sure’ or 3-‘false’); a total score was calculated. ( $\alpha = .61$ ).

*Knowledge of the Scottish SPCA:* Knowledge of the Scottish SPCA was assessed using one question ‘What do you know about the Scottish SPCA?’ with 10 items scored on a five-point Likert scale (1-‘strongly agree’- 5-‘strongly disagree’); a total score was calculated. ( $\alpha = .66$ ).

*Attitudes towards Animals:* This measure was adapted from the Pet Attitude Scale (PAS-M; Munsell et al., 2004; Daly & Morton, 2006) and comprised three scales, each with various items scored on a five-point Likert scale (1-‘strongly agree’- 5-‘strongly disagree’). The first scale related to pet animals and comprised nine items (e.g. ‘All pet animals should be cared for by humans’). The second scale related to wild animals and comprised eight items (e.g. ‘Wild animals should live free in the wild’). The third scale related to farm animals and comprised 12 items (e.g. ‘All farm animals should be able to go outdoors’). An overall total score for attitudes towards animals was calculated (minimum 28, maximum 140), as well as subtotals for each type of animal (pet/wild/farm). ( $\alpha = .72$ ).

*Attachment to Pets*: The Short Attachment to Pets Scale for Children and Young People, developed and validated by Marsa-Sambola et al. (2015, 2016), was used to measure attachment to pets. One nine-item scale asked children to ‘Please tell us how you feel about your favourite pet animal’. Each item was scored on a five-point Likert scale (‘strongly agree’ – ‘strongly disagree’). Total scores were calculated (minimum score 9, maximum score 45). ( $\alpha = .85$ ).

*Children’s Beliefs about Animal Minds (Child-BAM)*: The Child-BAM measure (Hawkins & Williams, 2016<sup>1</sup>) comprised five scales each with eight items. Each question (e.g. ‘Do you think the following animals are clever?’) related to a specific emotion (clever/pain/happiness/sadness/fear). These questions were repeated for eight animals (dog/cow/human/robin/frog/badger/chimpanzee/goldfish). Each item was scored on a five-point Likert scale (1-‘strongly agree’- 5-‘strongly disagree’). Overall sentence scores were calculated for each participant by adding the total score across scales ( $\alpha = .92$ ).

### ***Statistical Analysis***

1090 test participants and 127 control participants completed questionnaires at two sample points (pre-test and post-test). 447 participants in the test group completed questionnaires at three sample points (pre-test, post-test and delayed post-test). For the purpose of this evaluation, total scores were added for each key variable for each individual at each sample point and data was analysed at the individual level using SPSS Statistics 22 (SPSS Inc.), with a two-tailed significance of  $p < 0.05$ .

Initially the data was checked for outliers using box-plots. Normal distribution of dependant variables was checked using the Kolmogorov–Smirnov test, histograms, and skewness and

kurtosis values. This indicated that the data was not normal ( $p<.000$ ). Strongly positively skewed variables were transformed using logarithmic transformation (log 10) and strongly negatively skewed variables were transformed using reflect and logarithmic transformation (log 10). These transformations produced satisfactory skewness and kurtosis values. The assumption of homogeneity of variances was checked using the Levene's test ( $p>.05$ ) and the assumption of sphericity was tested using Mauchly's test of sphericity ( $p>.05$ ). To correct for unequal variances and violation of sphericity, Greenhouse-Geisser correction was used if the estimated epsilon ( $\epsilon$ ) was less than 0.75 and the Huynh-Feldt correction was used if estimated epsilon ( $\epsilon$ ) was greater than 0.75 (Maxwell & Delaney, 2004). Studentized residuals were calculated and residuals  $\geq \pm 3$  (standard deviations) were classified as outliers and not included in the analysis. Normality checking based on residuals using Q-Q plots indicated that the data did not violate the assumption of normality.

Each intervention (AFC;  $n = 771$ ; YYP;  $n = 39$ , WW;  $n = 157$ ; FFAW;  $n = 183$ ) was analysed compared to the control group ( $n = 127$ ) in separate analyses. A two-way mixed model ANOVA using time (phase of testing: pre-test, post-test) as the within subject, group (two conditions: test and control) as between subjects, tested main effects and interactions effects. The main focus of the results reported below are the interaction effects which show a difference in performance for intervention groups but not the control.

A one-way repeated measures ANOVA for each intervention group was used to determine differences in scores between pre-test, post-test and delayed post-test for each intervention. This was to give an indication of whether improvements were maintained six weeks after the education programme (following the school summer holiday).

## **Results**

**1. How effective was the ‘Scottish SPCA Animal Friendly Citizens’ intervention for knowledge, attitudes, attachment and beliefs about animal minds?**

The AFC intervention significantly increased knowledge about animals and knowledge about the Scottish SPCA. There was a statistically significant interaction between the intervention condition and time on knowledge about animals, ( $F(1,794) = 29.4, p = .000, \eta^2 = .004$ ) and knowledge about the Scottish SPCA ( $F(1,710) = 23, p = .000, \eta^2 = .031$ ). There was a statistically significant interaction between the intervention condition and time on and attitudes towards pets ( $F(1,749) = 5.22, p = .023, \eta^2 = .007$ ) but the group difference was found at pre-test and not post-test (Table 1 and 2).

Although there were trends towards improvements in a range of other measures including attitudes, attachment and Child-BAM following AFC (see Table 1) these failed to reach significance: Child-BAM, ( $F(1,721) = 2.84, p = .093, \eta^2 = .004$ ), attachment to pets, ( $F(1,746) = .48, p = .49, \eta^2 = .001$ ), attitudes towards animals, ( $F(1,631) = .215, p = .643, \eta^2 = .000$ ), wild animals, ( $F(1,711) = .0, p = .994, \eta^2 = .000$ ), farm animals ( $F(1,693) = .24, p = .63, \eta^2 = .000$ ).

**Long-term effects:** Significant pre-test-delayed post-test changes were found for knowledge about animals and knowledge about the Scottish SPCA, Table 4). All other variables were non-significant ( $p > .05$ ).

**2. How effective was the ‘You and Your Pet’ intervention for knowledge, attitudes, attachment and beliefs about animal minds?**

The YYP intervention significantly increased knowledge about animals, knowledge about the Scottish SPCA and Child-BAM. There was a statistically significant interaction between the intervention condition and time on knowledge about animals ( $F(1,149) = 23.61, p = .000, \eta^2 = .14$ ), knowledge about the Scottish SPCA, ( $F(1,141) = 15.96, p = .000, \eta^2 = .102$ ) and Child-BAM ( $F(1,143) = 8.54, p = .004, \eta^2 = .06$ ). The intervention significantly increased children's attachment to pets; there was a statistically significant interaction between the intervention condition and time on attachment to pets, ( $F(1,145) = 1.01, p = .016, \eta^2 = .04$ ), however the significance was lost following simple main effects analysis (see Tables 1 and 2).

Although there were trends towards improvements in attitudes following YYP (see Table 1) these failed to reach significance: attitudes towards animals ( $F(1,136) = 1.2, p = .28, \eta^2 = .009$ ), attitudes towards pets, ( $F(1,144) = .72, p = .398, \eta^2 = .005$ ), wild animals ( $F(1,143) = 1.51, p = .222, \eta^2 = .01$ ) and farm animals, ( $F(1,148) = 1.27, p = .26, \eta^2 = .008$ ). Main effects are presented in Table 3.

**Long-term effects:** Significant pre-post-delayed post-test changes were found for knowledge about the Scottish SPCA and Child-BAM (Table 4). All other variables were non-significant ( $p > .05$ ).

### 3. How effective was the 'Wildlife Welfare' intervention for knowledge, attitudes, attachment and beliefs about animal minds?

The WW intervention significantly increased knowledge about animals and knowledge about the Scottish SPCA. There was a statistically significant interaction between the intervention



and time on knowledge about animals ( $F(1,261) = 32.1, p = .000, \eta^2 = .11$ ) and knowledge about Scottish SPCA ( $F(1,240) = 25.8, p = .000, \eta^2 = .097$ ) (see Tables 1 and 2).

Although there were trends towards improvements in a range of other measures including Child-BAM, attachment and attitudes following WW (see Table 1) these failed to reach significance: Child-BAM, ( $F(1,233) = 2.21, p = .14, \eta^2 = .009$ ), attachment to pets, ( $F(1,252) = 0, p = .99, \eta^2 = .000$ ), attitudes towards animals, ( $F(1,200) = .35, p = .56, \eta^2 = .002$ ), attitudes towards pets, ( $F(1,227) = 3.03, p = .083, \eta^2 = .013$ ), wild animals ( $F(1,224) = .54, p = .463, \eta^2 = .002$ ) and farm animals ( $F(1,222) = .062, p = .803, \eta^2 = .000$ ). Main effects are presented in Table 3.

**Long-term effects:** Significant pre-post-delayed post-test changes were found for knowledge about animals and knowledge about the Scottish SPCA (Table 4). All other variables were non-significant ( $p > .05$ ).

#### 4. How effective was the ‘Food and Farm Animal Welfare’ intervention for each variable?

The FFAW intervention significantly increased knowledge about animals, knowledge about the Scottish SPCA and Child-BAM. There was a statistically significant interaction between the intervention condition and time on knowledge about animals ( $F(1,280) = 16.02, p = .000, \eta^2 = .054$ ), knowledge about the Scottish SPCA, ( $F(1,268) = 55.9, p = .000, \eta^2 = .17$ ) and Child-BAM, ( $F(1,259) = 21.7, p = .000, \eta^2 = .08$ ). There was a statistically significant interaction between the intervention and time on attitudes towards pets, ( $F(1,271) = 3.92, p = .049, \eta^2 = .014$ ). However, the significance was lost following simple main effects analysis (see Tables 1 and 2).

Although there were trends towards improvements in a range of other measures including attachment and attitudes following FFAW (see Table 1) these failed to reach significance: attachment to pets, ( $F(1,246) = 2.91, p = .089, \eta^2 = .012$ ), attitudes towards animals, ( $F(1,244) = 3.59, p = .059, \eta^2 = .015$ ), attitudes towards wild ( $F(1,265) = 3.16, p = .076, \eta^2 = .012$ ) and farm animals ( $F(1,266) = 2.88, p = .091, \eta^2 = .011$ ). Main effects are presented in Table 3.

**Long-term effects:** Significant pre-post-delayed post-test changes were found for knowledge about animals, knowledge about the Scottish SPCA and Child-BAM (Table 4). All other variables were non-significant ( $p > .05$ ).

## Discussion

The purpose of this study was to independently evaluate the ‘Prevention through Education’ programme developed by the Scottish SPCA. The animal welfare education programme had, overall, positive outcomes. However, significant changes were only found for knowledge about animals and knowledge about the Scottish SPCA for all of the interventions and also in Child-BAM for the YYP and FFAW interventions. It is encouraging that the hypotheses are supported for key variables and that the results are consistent with previous findings (e.g. Arbour et al., 2009), though further work is required to examine how we can significantly impact other child-animal variables. First, we will consider changes in knowledge and attitudes, and then attachment and beliefs about animal minds, before turning our attention to strengths and weaknesses of the study and future directions for research.

### Knowledge

The largest impact from all of the interventions was on knowledge about animals' needs and knowledge about the Scottish SPCA. The finding that education programmes have the largest impact on knowledge is supported by previous studies, such as Lakestani, Aguirre and Orihuela (2015) who found increased knowledge about farm animals following a farm intervention for 8-10 year-olds in Mexico, and Mariti et al, (2011) who found an increase in knowledge and education of the animal world following a classroom intervention with children aged 9-11 years in Italy. Accurate knowledge about animals and their appropriate needs can lead to positive animal welfare (Vermeulen & Odendaal, 1993). Thus, increasing knowledge through education, as demonstrated here, could have positive implications for children's treatment of animals. Knowledge about the Scottish SPCA also significantly increased following all interventions. Animal welfare organisations rely on public awareness for their charitable and rescue work, raising awareness of the charity among children engages children with the charity from a young age. The Scottish SPCA report: "Since 2010, reports of children being involved in cruelty to animals have decreased 16% and calls to our helpline from adults alerted by children to animals in danger have increased 545%" (Scottish SPCA Annual Review 2013, p.19).

#### Attitudes

There were no significant differences in attitudes following the interventions, despite some indication of trends towards positive attitude change. Previous research has shown, however, that attitudes towards animals can be significantly improved through education (Fitzgerald, 1981; Malcarne, 1983). Methodological differences in studies may help to explain these inconsistencies in research findings. A strength of the current study is that we used a control group, whereas not all evaluation studies that have found significant changes in attitudes included a control group (e.g. O'Hare & Montminy-Danna, 2001; Mariti et al., 2011). In our study it is notable that children who did not participate in the education

programme displayed a negative change in attitudes over time towards pet animals. Each intervention involved a single workshop lasting only one hour, therefore the trend towards improvements in children's attitudes towards animals bodes well for positive behaviour given that attitudes can correlate with behaviour (e.g. Kraus, 1995). However, further research is required to investigate how we can make a significant and long-term impact on children's attitudes towards animals through school-based education.

The lack of a significant change in attitudes towards animals may, in part, be explained in terms of ceiling effects given that both the test and control children had highly positive attitudes towards pets (60.3% scoring above the mean) at baseline. This left little scope for improvement and is consistent with previous research that evidences children demonstrate a great interest in pets and positive attitudes towards pets (Melson, 2003). Another explanation of our insignificant result may be that the research team were evaluating an existing programme that was not based on theoretical attitude or behaviour change models. Theory helps us to form the basis of interventions but there may not be 'one size fits all' for animal welfare education. Nevertheless, each theory and model of behaviour change, as well as those relating to attitudes, has validity and may provide useful recommendations to design animal welfare interventions (see Kwasnicka et al., 2016; De Leeuw et al., 2015). It is important to note that increasing knowledge is beneficial, however, information and exhortation are the least effective methods for changing behaviour (Bandura, 1977; Campbell, 1963) and 'being told what to do' is also not effective (Branson et al., 2012). Psychological behaviour change models highlight the importance of perceived benefits of a behaviour and perceived barriers to a behaviour, which animal welfare programmes should aim to target. There are many benefits of helping animals both intrinsic and extrinsic that children can be made aware of, as well as potential barriers which may be preventing children from behaving appropriately toward animals, such as lack of knowledge about welfare needs

and appropriate care, that can be taught through these interventions (Muldoon et al., 2015). By basing animal welfare interventions on theory and research, we may see more effective change in attitudes and behaviour.

#### Attachment

Children scored higher on attachment to pets following each intervention but the change was not significantly different from the control group. There are implications in promoting positive attachment for animal welfare given that low attachment predicts higher acceptance of animal cruelty and neglect (Hawkins & Williams, in preparation) and high attachment tends to correlate with animal welfare (Melson, 2001). Further research is needed to investigate how we can successfully promote attachment to animals. Similarly, with attitudes, both the test and the control children scored high on attachment to pets at baseline (63% scoring above the mean) which may explain our insignificant findings. Consistent with previous research (e.g. Melson, 1990), our study shows that children demonstrate high attachment to their pets. Promoting attachment should be an aim of animal welfare interventions (Muldoon et al., 2009) and future research should investigate the best methods of targeting children's attachment to animals. Ideally, a logic model for animal welfare interventions should be built that integrates theory and research on childhood attachment and attachment-based interventions.

#### Beliefs about animal minds

Children's beliefs about animal minds increased following all interventions but only significantly for the YYP and FFAW interventions. This result is consistent with previous research that class-room based interventions can increase perceptions of animal sentience (Fonseca et al., 2011). However, in our case, only the pets and farm animal interventions were effective at doing so. The significant improvements seen in Child-BAM found for YYP

and the FFAW interventions is extremely positive in terms of animal welfare given that beliefs about animal minds is associated with: caring and humane behaviour, concern for animal's well-being, empathy, compassion and attitudes towards animals, attachment to pets and lower acceptance of intentional and unintentional animal cruelty and animal neglect (Herzog & Galvin, 1997; Hills, 1995; Knight et al., 2004; Ellingsen et al., 2010; Hawkins & Williams, 2016<sup>1</sup>).

A possible explanation as to why the FFAW intervention was effective at increasing Child-BAM is that it included material about animal sentience, such as a video about a cow limping and a farmer being given advice from a Scottish SPCA inspector; this video highlighted that cows feel pain, which could explain the increase in Child-BAM scores in this intervention. Similarly, the YYP intervention encourages the children take an animal's perspective. For example, in the board game they are asked "You see children chucking stones at an injured dog. Should you help the dog?". This leads them to consider that an animal might feel pain and that it is wrong to hurt an animal. The YYP workshop also focused on familiar animals that children form emotional attachments with, it was a highly interactive session and the workshop used emotional stimuli with examples of animal neglect including a rabbit and cat that had been abandoned in a box, and a puppy with broken legs. Animal sentience was not a focus in the AFC or WW workshops, highlighting the importance of including material on animal sentience in animal welfare education programmes.

As demonstrated by the current findings and from previous studies, animal welfare education can have positive impacts but improvements may be subject to decline over time (e.g. Jamieson et al., 2012). Improvements in the current study were maintained for at least six weeks but only for animal needs knowledge and knowledge about the Scottish SPCA. Follow-up instruction or frequent, repeated education sessions may be more beneficial than a

one-off intervention workshop for long-term positive impact (Malcarne, 1983; Coleman et al., 2008; Williams et al., in preparation).

## **Limitations and Future Research**

As a quasi-experimental study evaluating an existing intervention running in schools throughout Scotland, there were some limitations in terms of the control the research team had over sample selection and school recruitment. This meant different interventions had different sample sizes and the control group was formed of schools who did not engage at all with the Scottish SPCA, and thus were difficult to recruit to a research study involving the Scottish SPCA education programme. These limitations would be remedied with a more rigorous experimental design, however, this would be at the expense of evaluating real work interventions as they are carried out in normal practice.

This study only examined children in Scotland and should therefore be generalised to other cultural contexts with caution. Cultural (e.g. Risley-Curtiss, Holley & Wolf, 2006) and demographic factors (e.g. Hensley, Tallichet & Dutkiewicz, 2011) may influence the relationship between children and animals and so it is important that future research and animal welfare education programmes are tailored to various multicultural, social and economic backgrounds (Ascione, 1997; Faver, 2010).

This study did not examine moderation factors such as age, gender, demographics, pet ownership, family affluence, or personality measures (Mathews & Herzog, 1997). These variables each have an impact on human-animal interactions and might influence how receptive children are to animal welfare education interventions. Further research is required to examine the effectiveness of animal welfare education interventions for different target groups of children, who may pose different levels of risk to animals.

520

## 521 **Animal Welfare Education Implications**

522       There are a range of educational implications of these findings. Firstly, animal welfare  
523 education can be designed to fit into the classroom and have a beneficial impact on  
524 knowledge and other variables related to the humane treatment of animals. This programme  
525 demonstrates how animal welfare education can be built into a range of curriculum areas  
526 (science, citizenship and even literacy and maths). A survey of almost 800 teachers across  
527 England and Wales was conducted by the RSPCA (2014) found that 83% felt that animal  
528 welfare should be part of the national curriculum and 93% stated that they would teach  
529 animal welfare in the classroom if time permitted. The Scottish SPCA's 'Prevention through  
530 Education' is linked to Scottish education systems Curriculum for Excellence, and adopts  
531 pedagogical approaches appropriate for primary school children which has helped its  
532 acceptance in schools across Scotland.

533       Secondly, while single workshop interventions lasting one hour have a clear impact  
534 on knowledge, longer term interventions are likely to be required for attitude change and  
535 positive behavioural change (Malcarne, 1983; Coleman et al., 2008; Williams et al., in  
536 preparation); the implications are that schools should participate in animal welfare workshops  
537 on a regular basis. Thirdly, this study is one of the first to scientifically evaluate the  
538 effectiveness of an animal welfare education programme for primary school aged children,  
539 despite recognition of the importance of education by a wide range of animal welfare  
540 organisations. An online survey of 22 animal welfare organisations and humane societies  
541 revealed that although organisations create education programmes, they do not evaluate their  
542 effectiveness (Muldoon et al., 2009). Scientific evaluations, such as this one, are invaluable  
543 tools for demonstrating the positive impact of such programmes, finding out what is working



or not working, and reviewing and enhancing programmes. Finally, this research has led to the creation of useful age-appropriate assessment tools including new measures, such as the Child-BAM measure. This evaluation tool, and specific measures, will be available to other research teams and welfare organisations to promote the evaluation of animal welfare education programmes.

## **Conclusions**

This study provides evidence of the effectiveness of the Scottish SPCA's 'Prevention through Education' programme in successfully improving knowledge of animal welfare needs, knowledge about the Scottish SPCA and children's beliefs about animal minds. While there were positive trends towards attitude change and stronger attachment following the interventions, further research is required to reveal how these can be promoted effectively through school based education. By basing animal welfare education on theory and research (such as attitude and behaviour change models as well as child development and attachment models), we can start to build theoretically-driven logic models for our interventions, which may lead to more successful outcomes and effective changes in child-animal interactions. There is currently a lack of evidence-based methods that positively influence the factors underlying the child-animal relationship, which are crucial for designing and implementing successful education programmes. Through the evaluation of animal welfare education programmes, significant and sustained improvements can be made that will positively influence the treatment of animals, preventing both unmotivated and motivated animal cruelty.

## Acknowledgements

We would like to thank all of the teachers and children who were involved for their invaluable time and co-operation during this research. We also thank the Scottish SPCA staff for their co-operation in this research.

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716

717



718 **Table 1.** Descriptive Statistics.

Intervention	Pre-test		Post-test	
	M	SD	M	SD
Knowledge about animals (high score = high knowledge)				
AFC	3.5	1.9	4.9	2
YYP	4	1.8	6	1.8
WW	3.4	1.6	4.9	2
FFAW	3.6	1.5	4.5	1.8
<b>Control</b>	<b>3.2</b>	<b>1.7</b>	<b>3.3</b>	<b>2</b>
Knowledge about the Scottish SPCA (low score = high knowledge)				
AFC	1.19	.1	1.1	.1
YYP	1.2	.1	1.1	.1
WW	1.23	.1	1.1	.1
FFAW	1.23	.1	1.1	.1
<b>Control</b>	<b>1.26</b>	<b>.1</b>	<b>1.24</b>	<b>.1</b>
Children's beliefs about animal minds (low score = high BAM)				
AFC	1.8	1.8	1.75	.1
YYP	1.8	1.8	1.72	.1
WW	1.8	1.8	1.77	.1
FFAW	1.8	1.8	1.73	.1
<b>Control</b>	<b>1.8</b>	<b>1.8</b>	<b>1.78</b>	<b>.1</b>
Attitudes towards animals (low score = positive attitudes)				
AFC	1.69	.08	1.68	.1
YYP	1.69	.07	1.67	.07
WW	1.7	.07	1.69	.08
FFAW	1.69	.07	1.67	.07
<b>Control</b>	<b>1.7</b>	<b>.08</b>	<b>1.69</b>	<b>.09</b>
Attitudes towards pet animals (low score = positive attitudes)				
AFC	1.16	.08	1.15	.08
YYP	1.16	.09	1.15	.08
WW	1.17	.08	1.17	.08
FFAW	1.16	.08	1.15	.07
<b>Control</b>	<b>1.13</b>	<b>.08</b>	<b>1.16</b>	<b>.1</b>
Attitudes towards wild animals (low score = positive attitudes)				
AFC	1.16	.13	1.14	.13
YYP	1.16	.12	1.13	.11
WW	1.18	.13	1.15	.13
FFAW	1.15	.13	1.12	.13
<b>Control</b>	<b>1.18</b>	<b>.13</b>	<b>1.16</b>	<b>.15</b>
Attitudes towards farm animals (low score = positive attitudes)				
AFC	20	3.8	19.9	3.8
YYP	19.8	3.5	18.9	3.3
WW	20	4	20	4.3
FFAW	20	3.8	19	3
<b>Control</b>	<b>21</b>	<b>4.6</b>	<b>20.8</b>	<b>4.9</b>
Attachment to animals (low score = high attachment)				
AFC	1.14	.14	1.12	.14
YYP	1.19	.15	1.11	.17
WW	1.14	.15	1.13	.15
FFAW	1.14	.14	1.1	.13
<b>Control</b>	<b>1.15</b>	<b>.16</b>	<b>1.13</b>	<b>.15</b>

719 *Note.* Bold indicates a significant result at the  $p < .05$  level. AFC=Animal Friendly Citizens,  
 720 YYP= You and Your Pet, WW= Wildlife Welfare, FFAW= Food and Farm Animal Welfare.

721

**Table 2.** Results from simple effects analysis for each intervention.

Test x Control at Pre-test				Test x Control at Post-test			
<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2$	<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2$
<b>‘Scottish SPCA Animal Friendly Citizens’ intervention</b>							
Knowledge about animals							
1,831	3.2	.074	.004	1,824	65.7	<b>.000</b>	.074
Knowledge about Scottish SPCA							
1,757	32.3	<b>.000</b>	.041	1,806	111.4	<b>.000</b>	.121
Attitudes towards pets							
1,768	3.93	<b>.048</b>	.005	1,791	.99	.321	.001
<b>‘You and Your Pets’ intervention</b>							
Knowledge about animals							
1,162	6.28	<b>.013</b>	.04	1,162	55.7	<b>.000</b>	.26
Knowledge about Scottish SPCA							
1,147	4.1	<b>.045</b>	.03	1,145	35	<b>.000</b>	.194
Child-BAM							
1,147	.04	.85	.000	1,149	4.5	<b>.036</b>	.03
Attachment to pets							
1,146	2.05	.16	.014	1,152	.2	.654	.001
<b>‘Wildlife Welfare’ intervention</b>							
Knowledge about animals							
1,268	.39	.533	.001	1,261	35	<b>.000</b>	.12
Knowledge about Scottish SPCA							
1,259	1.48	.225	.006	1,246	32.8	<b>.000</b>	.12
<b>‘Food and Farm’ intervention</b>							
Knowledge about animals							
1,307	5.24	<b>.023</b>	.017	1,303	26.2	<b>.000</b>	.08
Knowledge about Scottish SPCA							
1,295	3.4	.066	.011	1,299	13.12	<b>.000</b>	.042
Child-BAM							
1,288	.16	.692	.001	1,299	13.29	<b>.000</b>	.043
Attitudes towards pets							
1,274	1.27	.26	.005	1,282	2.59	.11	.009

*Note.* Bold indicates a significant result at the  $p < .05$  level.

726 **Table 3.** Results from main effects analysis for each intervention following insignificant  
727 interactions.

Main effect of time				Main effect of group			
<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2$	<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2$
<b>‘Scottish SPCA Animal Friendly Citizens’ intervention</b>							
Child-BAM							
1,721	11.61	<b>.001</b>	.016	1,721	3.79	.052	.005
Attachment to pets							
1,767	11.26	<b>.001</b>	.014	1,767	.53	.47	.001
Attitudes towards animals							
1,631	1.5	.218	.002	1,631	3.75	.053	.006
Attitudes towards wild animals							
1,711	.5	.484	.001	1,711	4.49	<b>.034</b>	.006
Attitudes towards farm animals							
1,693	5.95	<b>.015</b>	.009	1,693	5.54	<b>.019</b>	.008
Compassion towards animals							
1,735	.343	.558	.000	1,735	2.94	.087	.004
Humane behaviour towards animals							
1,715	8.77	<b>.003</b>	.012	1,715	.53	.469	.001
<b>‘You and Your Pets’ intervention</b>							
Attitudes towards animals							
1,136	.053	.82	.000	1,136	.94	.334	.007
Attitudes towards pets							
1,144	.286	.59	.002	1,144	.07	.795	.000
Attitudes towards wild animals							
1,143	.03	.87	.000	1,143	.864	.354	.006
Attitudes towards farm animals							
1,148	.06	.81	.000	1,148	3.54	.062	.023
Compassion towards animals							
1,145	1.23	.27	.008	1,145	.35	.56	.002
Humane behaviour towards animals							
1,140	.06	.81	.000	1,140	1	.317	.007
<b>‘Wildlife Welfare’ intervention</b>							
Child-BAM							
1,233	1.2	.274	.005	1,233	.006	.94	.000
Attachment to animals							
1,252	.06	.804	.000	1,252	.119	.73	.000
Attitudes towards animals							
1,200	.38	.54	.002	1,200	.000	.984	.000
Attitudes towards pets							
1,227	.18	.67	.001	1,227	4.98	.027	.021
Attitudes towards wild animals							
1,224	<b>.03</b>	.87	.000	1,224	.557	.456	.002
Attitudes towards farm animals							
1,222	<b>.01</b>	.93	.000	1,222	.396	.53	.002
Compassion towards animals							
1,227	.51	.48	.002	1,227	2.49	.116	.011
Humane behaviour towards animals							
1,248	.07	.799	.000	1,248	.289	.591	.001
<b>‘Food and Farm’ intervention</b>							
Attachment to animals							
1,246	.233	.63	.001	1,246	5.02	.026	.02
Attitudes towards animals							
1,244	5.33	.022	.021	1,244	7.62	.006	.03
Attitudes towards wild animals							
1,265	2.48	.117	.009	1,265	8.11	.005	.03
Attitudes towards farm animals							

1,266	2.41	.122	.009	1,266	9.25	.003	.03
Compassion towards animals							
1,271	2.46	.118	.009	1,271	.095	.76	.000
Humane behaviour towards animals							
1,246	<b>.042</b>	.837	.000	1,246	1.36	.245	.005

*Note.* Bold indicates a significant result at the  $p < .05$  level.

731 **Table 4.** Results from one-way repeated measures ANOVA using test group data only for the  
732 interventions.

Main effect			Pre and post-test		Post and delayed	Pre and delayed
<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2$	<i>p</i>	<i>p</i>	<i>p</i>
<b>'Scottish SPCA Animal Friendly Citizens' intervention</b>						
Knowledge about animals						
1,9,622	4.32	.015	.014	.000	1	.000
Knowledge about Scottish SPCA						
2,532	21.8	.000	.076	.000	.052	.000
<b>'You and Your Pets' intervention</b>						
Knowledge about Scottish SPCA						
2,14	4.63	<b>.029</b>	.4	.001	.045	.027
Child-BAM						
2,542	3.58	.029	.013	.000	.002	.000
<b>'Wildlife Welfare' intervention</b>						
Knowledge about animals						
2,190	3.92	.021	.04	.000	1	.000
Knowledge about Scottish SPCA						
2,160	5.42	.005	.063	.000	.854	.000
<b>'Food and Farming' intervention</b>						
Knowledge about animals						
2,158	6.96	.001	.081	.000	.002	.012
Knowledge about Scottish SPCA						
2,140	26.23	.000	.273	.000	.000	.000
Child-BAM						
2,142	3.38	.037	.045	.000	.002	.000

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